ENGLISH TRANSLATION OF ARTICLE 19 AMENDMENT
from PCT/JP2004/018050

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[Amendments]

CLAIMS

1. (Amended) A bonding apparatus comprising a bonding part which bonds together a plurality of substrates coated with an adhesive agent, and a curing part which cures the adhesive agent of the substrates that have been bonded together, characterized in that

the bonding apparatus has conveying means which conveys the substrates from the bonding part to the curing part, and

the conveying means has a standing part which allows the bonded substrates to stand at room temperature in the atmosphere while conveying the plurality of substrates following bonding.

10. (Amended) A bonding method in which a plurality of substrates are coated with an adhesive agent, the substrates are bonded, and the adhesive agent is cured, characterized in that

the plurality of substrates are allowed to stand at room temperature in the atmosphere while being conveyed from the bonding position for the substrates to the curing position for the adhesive agent.

Informal Comments

Informal Comments Regarding International Search Opinion

(1) Reasons for Affirming Inventive Step

In the international search opinion dated January 11, 2005 (date transmitted), an opinion maintaining that the inventions of claims 1 through 14 of the present application had no inventive step was indicated.

However, the applicant revised the description of the claims as indicated in the amendments submitted on the same date as these comments, and clarified the differences between the invention of the present application and the inventions described in Patent References 1 and 2 noted as examples in the international search report. Accordingly, it appears that an inventive step should be affirmed for the invention of the present application.

The reasons for this will be described in detail below. Furthermore, claims 2 through 9 are claims that are subordinate to claim 1, and claim 10 is a claim that captures the invention of claim 1 from the standpoint of a method. Claims 11 through 14 are claims that are subordinate to claim 10. Accordingly, the points of difference are clarified by comparing the inventions of Patent References 1 and 2 and the invention of claim 1 (hereafter referred to as the present invention).

(1-1) Basis of Amendment

Claim 1 following amendment is a claim applying the limitation that the allowing of substrates to stand in the standing part of claim 1 prior to amendment is performed while "conveying a plurality of substrates". This limitation is based on the following description in paragraph 0020: "A 12-position turntable 1 is used as a conveying means for conveying substrates from the bonding part to the curing part. This turntable 1 rotates while carrying substrates or susceptors that carry substrates. 12 substrate carrying parts 1a are constructed along the circumference of this turntable.", and on the following description in paragraph 0024: "The bonded substrates are conveyed out into the atmosphere at room temperature from the vacuum vessel by the rotation of the turntable 1, and move through pre-curing standing positions 14a through 14d, so that these substrates are allowed to stand for a fixed time, thus correcting the warping".

Accordingly, the matters described in amended claim 1 are matters that were described in the initial specification of the application, and do not involve the addition of any new matters.

(1-2) Gist of the Present Invention

The gist of the present invention following amendment is as follows:

A bonding apparatus (a) comprising a bonding part which bonds together a plurality of substrates coated with an

adhesive agent, and a curing part which cures the adhesive agent of the substrates that have been bonded together, characterized in that (b) the bonding apparatus has a conveying means which conveys substrates from the bonding part to the curing part, and (c) the conveying means has a standing part which allows the bonded substrates to stand at room temperature in the atmosphere while conveying a plurality of substrates following bonding.

(1-3) Differences in Problems and Objects

As is described in paragraphs 0007 through 0009, it is an object of the present invention to "prevent warping by ensuring a sufficient standing time following substrate bonding by means of a simple and compact apparatus" in order to solve the problem of "not being able to ensure a sufficient standing time to correct warping".

On the other hand, as is described in paragraphs 0005 through 0009, it is an object of the invention described in Patent Reference 1 to "perform a first ultraviolet irradiation following mechanical alignment of the center hole, and to perform a second ultraviolet irradiation in a state that applies no mechanical stress to the center hole" in order to solve the problem of "a large stress being applied to the area of the center hole in the bonded disks prior to curing when ultraviolet irradiation for the purpose of curing the ultraviolet curable adhesive agent is performed." Thus, since

the problem and object of the invention of Patent Reference 1 are to alleviate mechanical stress during ultraviolet irradiation (curing), this invention differs from the present invention having a problem and object of ensuring a sufficient standing time following bonding and prior to curing.

Furthermore, as is described in paragraphs 0006 through 0011, it is an object of the invention described in Patent Reference 2 to "prevent the admixture of gas bubbles, and shorten and automate the bonding time" in order to solve the problems of "the admixture of gas bubbles with the adhesive agent during bonding", and "unsuitability for automation because of the long tact time of bonding". Thus, since the problem and object of the invention of Patent Reference 2 are to improve the bonding method, this invention differs from the present invention having a problem and object of ensuring a sufficient standing time following bonding and prior to curing.

(1-4) Differences in Construction

As was described above, it is an object of the present invention to ensure a sufficient standing time prior to curing; accordingly, the present invention is characterized in terms of construction by the fact that "the conveying means for conveying substrates from the bonding part to the curing part has a standing part that allows the bonded substrates to stand at room temperature in the atmosphere while a plurality of these substrates are conveyed following bonding."

However, in the case of the invention described in Patent Reference 1, it is merely an object of the invention to alleviate mechanical stress during ultraviolet irradiation (curing). Accordingly, as is indicated in paragraphs 0033 through 0037 and Fig. 1, a conveying arm 10 and turntable 11 which convey disks between a first ultraviolet irradiation position 6 and second and third ultraviolet irradiation positions 17 and 18 are disclosed; however, there is no description or suggestion regarding a "standing part which allows the substrates to stand at room temperature in the atmosphere while conveying a plurality of substrates between the bonding part and curing part".

Furthermore, in the invention described in Patent Reference 2, as is shown in paragraphs 0033 through 0036 and Fig. 1, a device in which an adhesive agent is uniformly dispersed by means of high-speed spinning parts 7a and 7b, after which bonding by means of a bonding device 10, pressing by means of a disk pressing device 11, and curing by means of an adhesive agent curing device 12, are successively performed in a position adjacent to a lower rotating body 26 is disclosed only with the object of improving the bonding method. There is no description of "a standing position in which substrates are allowed to stand at room temperature in the atmosphere while a plurality of substrates are conveyed between the bonding part and curing part".

Accordingly, the inventions described in Patent References 1 and 2 clearly have constructions that are different from that of the present invention.

(1-5) Differences in Operation and Effects

As was described above, the present invention differs from the inventions of Patent References 1 and 2 in that the present invention has "a standing part which allows substrates to stand while conveying a plurality of substrates following bonding" in order to ensure a sufficient standing time.

Thus, in the present invention, since a plurality of substrates are allowed to stand while being conveyed, the standing time for the respective substrates can be ensured in the conveying part for a plurality of substrates; furthermore, the supply of substrates to the curing part following this standing can be performed without interruption. For example, in the first embodiment shown in Fig. 1, the respective substrates can be allowed to stand while these substrates move through the pre-curing standing positions 14a through 14d; furthermore, the curing in the curing position 15 can be continuously performed without any interruption. In other words, in the present invention, a series of operations can be caused to proceed simultaneously in the bonding part, standing part and curing part during continuous conveying, so that disks can be manufactured with a fixed cycle time. A

sufficient standing time can be ensured without extending the cycle time.

Meanwhile, in Patent Reference 1, there is likewise no disclosure regarding the conveying means installed before the first ultraviolet irradiation device 6. Accordingly, a sufficient standing time cannot be ensured without extending the cycle time prior to ultraviolet irradiation, as is possible in the present invention. Furthermore, in Patent Reference 2 as well, there is no standing part located between the disk pressing device 11 and adhesive agent curing device 12; a sufficient standing time cannot be ensured without extending the cycle time.

Thus, the inventions described in Patent References 1 and 2 clearly differ from the present invention in terms of operation and effects as well.

(1-6) Difficulty of Combination

As was described above, the inventions of Patent References 1 and 2 are clearly different in terms of problems and objects, construction, and operation and effects. Furthermore, in Patent Reference 1, in paragraph 0046, it is indicated that when two disks 4 are bonded together via an adhesive agent, and are then allowed to stand for a specified time on a supporting member, the disks assume a flat state. However, there is no description of the means or apparatus used. What is described in Patent Reference 1 is a conveying

arm 10 which conveys substrates between a first ultraviolet irradiation device 6 and second and third ultraviolet irradiation devices 17 and 18. Conveying by means of such a conveying arm 10 merely conveys the disks 4 one at a time. Accordingly, in order to ensure a sufficient standing time, it is necessary to extend the conveying time by means of the conveying arm 10 or to lengthen the conveying distance. This leads to a lengthening of the cycle time or an increase in the installation space.

Meanwhile, in Patent Reference 2, it is indicated that substrates are conveyed by means of a lower side rotating body 26. However, there is no description or suggestion of any maintenance of a sufficient standing time. Lowering the rotational speed of the lower side rotating body 26 opposes the object of shortening the bonding time. Furthermore, considered from the layout positions of the peripheral bonding device 10 of the lower side rotating body 26, the disk pressing device 11, the adhesive agent curing device 12 and the disk inspection device 13 as well, there is absolutely no concept of designing the distance from the disk pressing device 11 to the adhesive agent curing device 12 as a long length.

Accordingly, there is no description that would make it possible to arrive at the concept of "a standing part that allows substrates to stand at room temperature in the

atmosphere while conveying a plurality of substrates between the bonding part and the curing part" in Patent References 1 and 2.

(2) Conclusion

As was described above, the present invention cannot easily be invented by a person skilled in the art from Patent References 1 and 2. Accordingly, an inventive step should be affirmed.